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IMPROVED PROCEDURES FOR DETERMINING SEISMIC SOURCE DEPTHS FROM DEPTH PHASE INFORMATION

QUARTERLY REPORT

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All planned program development work on the Seismic Data Analysis Center (SDAC) version of the source depth determination program has been completed. In addition, the program has been modified to process seismograms from the Area of Interest (AI) data set. One event, AI Event No. 1 (7/26/77), was run as a test, and a depth estimate of 21 Km was obtained.

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INTRODUCTION AND SUMMARY

During this quarter, program development was completed, and processing of events from the Area of Interest (AI) data set was started. The final program development work consisted of implementation of the new significance level and narrow band threshold algorithms developed during the previous quarter. After this was completed, the program was modified to read seismograms from AI data tapes. The first event in this data set, AI Event No. 1, was processed and a depth estimate of 21 Km was obtained.

MAJOR ACCOMPLISHMENTS

All planned program development tasks have been completed. The final work, completed during this quarter, was the implementation of the new significance level and narrow band threshold algorithms, which are described in detail in the previous Quarterly Report. Briefly, the new significance level algorithm gives improved significance level estimates, along with estimated significance level standard deviations. The narrow band threshold algorithm computes the shallowest interpretable depth, resulting from data bandwidth, for a given set of seismograms. Both of these program features are designed to aid the analyst in interpreting the final depth plots.

Processing of AI data was started by modifying the depth determination program to read seismograms from the AI data tapes. In its present form, the program is capable of reading seismograms from Seismic Research Observatory (SRO) and

Special Data Collection System (SDCS) stations, assuming seismogram numbers are in increasing order on an event tape. Array data can also be processed, but a maximum of 15 stations can be used, and seismograms with different sample intervals cannot be mixed in a single run. More data can be processed if additional program modifications are made.

The first event in the AI data set, AI Event No. 1 (7/26/77), was run to test these modifications. Seismograms from five SRO stations were processed; these are shown in Figure 1. Cepstrums were computed using 12.8 sec. windows for the first 51.6 sec. of each seismogram. In the time interval examined, only P arrivals were significant, and the resulting P depth plot is shown in Figure 2. From this plot, the estimated source depth for AI Event No. 1 is 21 Km; further analysis is necessary, however, before reliability grade can be assigned to this estimate.

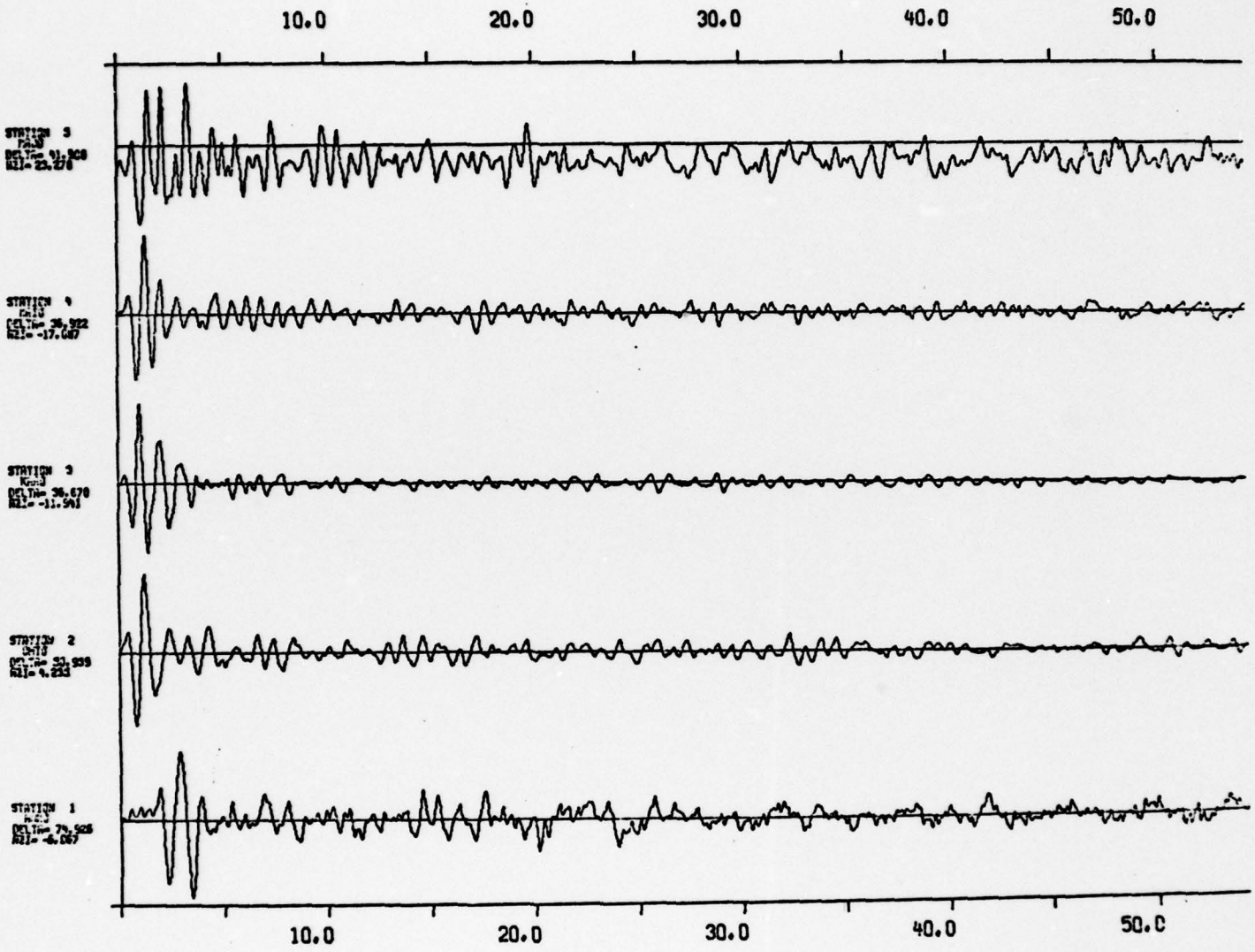

Figure 1. AI Event No. 1, Seismograms

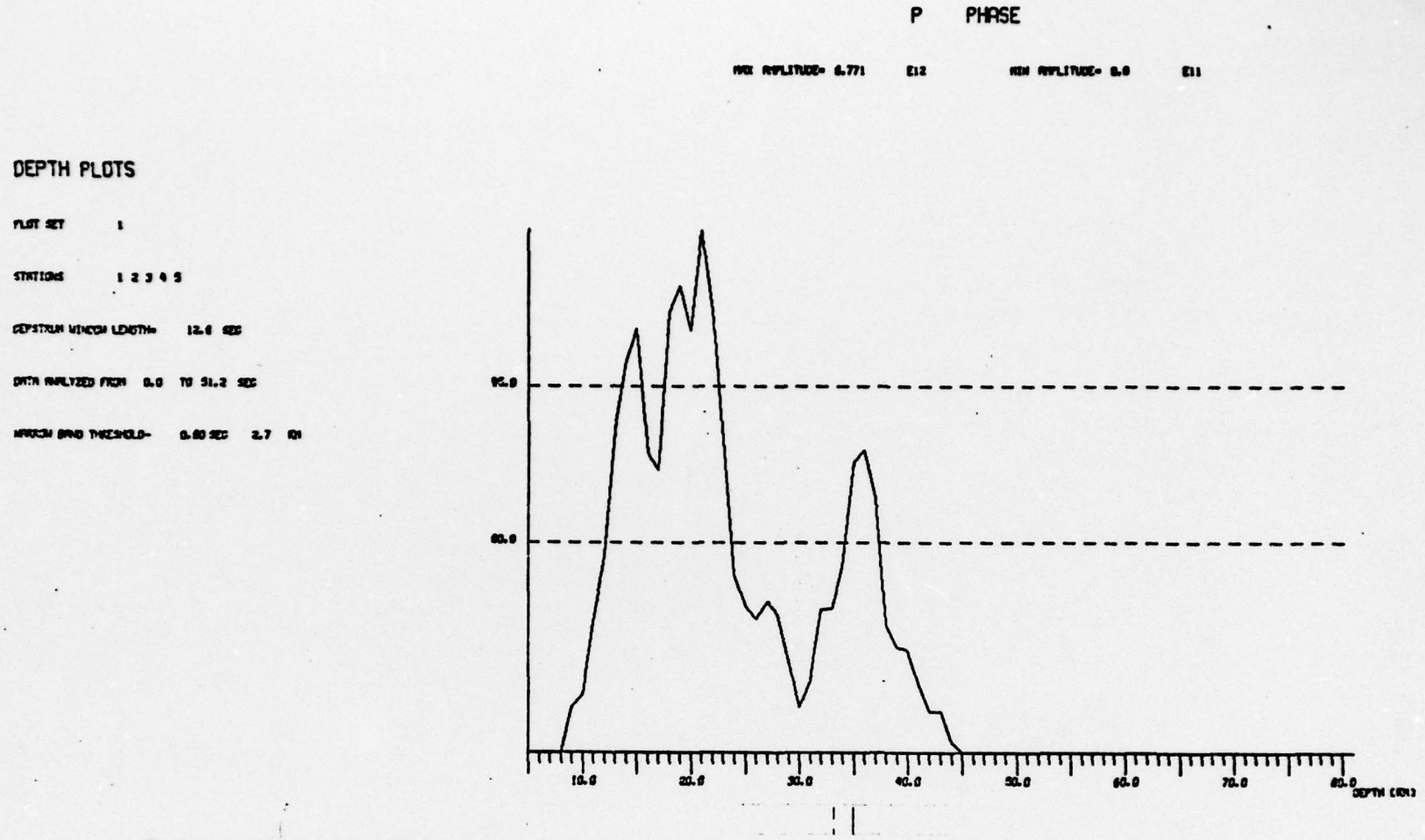

Figure 2. AI Event No. 1, P Depth Plot